

BUTTERMAKING ON THE FARM

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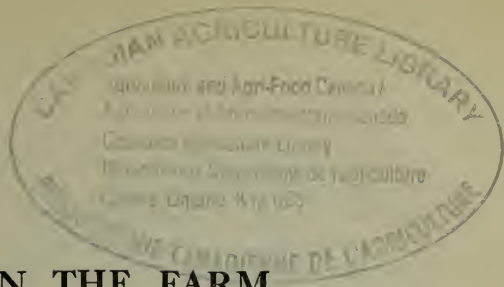
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BUTTERMAKING ON THE FARM

"Dairy" butter as defined by "The Dairy Industry Act, 1914," is butter made from the milk of less than fifty cows.

Buttermaking on the farm is almost a thing of the past in some sections of the country, where "Dairy" buttermaking has been superseded by the cheese factory and the creamery. The evolution of the creamery is a natural outcome of the tendency towards division of labour and co-operation, and the creamery system has many advantages which recommend it to the dairy farmer. Greater uniformity of product, a higher average quality, ease of marketing on account of the larger quantity to be sold as one lot and better average prices are some of the points which have made the creamery system popular.

The farmer who is within reach of a well managed creamery will do well to patronize it, but the fact remains that there are many dairy farmers in Canada who cannot avail themselves of the advantages of a creamery, or of a cheese factory, and it is in the interest of the producers of creamery butter that the quality of the dairy butter should be made as fine as possible. A large quantity of inferior dairy butter helps to lower the general average of the whole Canadian output and also acts as a serious check to consumption. If all the dairy butter were of finest quality, the increase in consumption would be enormous and better average prices would prevail for all butter. The annual loss to the farmers of Canada, as represented by the difference in the value of dairy butter and creamery butter, amounts to several million dollars a year.

SOME OF THE DEFECTS IN DAIRY BUTTER

The main defects in dairy butter as compared with creamery butter are, (1) bad flavour, (2) staleness and rancidity, (3) too many shades of colour, and (4) unsuitable packages. The flavour is of the highest importance and no matter how good the butter may be in other respects, if the flavour is wrong, it is bound to be classed as an inferior article. Staleness and rancidity, so common in dairy butter are due largely to the fact that the cream and the butter itself are not kept at a low temperature.

Any taint that may be in the milk or cream will, to some extent, be carried into the butter. Therefore, the dairy buttermakers will see at once the necessity for having healthy cows, providing them with wholesome feed and pure water, and having the cream properly taken care of until time for churning.

Feeds that will injure the flavour of butter:—

1. Turnips and turnip tops.
2. Rape or rye.
3. Decayed ensilage.
4. Leaks, onions, or apples in large quantities.
5. Weeds such as sage-brush, rag weed, stink weed.

Other causes of taints in butter:—

1. Unclean condition of cows' udders and teats at milking time.
2. Milking in unclean stables.
3. Using unclean, wooden, galvanized or rusty milking pails.
4. Separating the milk in the stables.
5. Improperly cleaned separators.
6. Keeping the cream in cellars or other places where there are roots or vegetables.

7. Keeping the cream in cellars for several days at a temperature over 55 degrees F.
8. Cows drinking water from stagnant ponds, or water contaminated with seepage from barnyards.
9. Exposure of milk or cream to gasoline odours. Suggestions for avoiding a gasoline flavour in butter are given on page 3.

CONDITIONS THAT ARE NECESSARY TO PRODUCE FINE FLAVOURED CREAM

Pure Water.—The cows should have at all times an abundant supply of pure water to drink. When cows are compelled to drink the water of swamps, muddy ponds or sluggish streams and ditches, in which there is decaying animal matter, including their own droppings, there is a constant menace to their health and, unless the cows are in good health, they cannot give first-class milk. Moreover, the mud, often full of foul germs, which collects on the legs, flanks and udders of the cows and falls into the milk at the time of milking, is a direct source of infection.

Salt.—When cows have free access to salt at all times, they will keep in better health, will give more milk, and the cream from this milk will have a better flavour, and keep sweet longer, than when they do not get any at all, or receive it only at intervals.

Milking.—Cleanliness in the stable is desirable at all times, but especially at milking time the stable should be clean and free from dust. The udders, teats and flanks should be clean when the cows are being milked. Only bright, clean, tin pails should be used to milk in. Galvanized pails are difficult to keep clean and bad flavours have been traced to their use.

Utensils.—Fine flavoured cream cannot be obtained unless the utmost care be exercised in cleaning and sterilizing all utensils with which the milk and cream come in contact. Dairy tinware should be rinsed in luke warm water, then washed in hot water containing a little washing soda, using a brush (not a cloth) on both the inside and outside. Next, scald thoroughly with boiling water and place where they will drain and dry, preferably exposed to the sunshine. The cheesecloth milk strainer is a source of objectionable flavour in cream and butter unless it is washed, boiled and dried quickly after each milking. The newer type, consisting of a combination of wire mesh and absorbent cotton strainers, lessens the danger of poor flavours. The cloth part of the strainer is small and inexpensive, so that a new piece may be used for each milking, thus avoiding any possibility of contaminating the milk from this source.

SEPARATION OF MILK

The centrifuge or cream separator is the most reliable and best method of skimming milk at the farm.

Some of the advantages over the old style gravity methods are: (1) less loss of fat in the skim-milk, (2) a better and more uniform quality of cream, (3) less time and labour required, and (4) the skim-milk is in the best possible condition for feeding young stock.

Handling and Care of Separator.—It is important that the separator runs smoothly. Any trembling or shaking of the separator while skimming will cause a loss of butter fat in the skim-milk. Only special separator oil should be used and it is well to make a run once in three weeks using kerosene oil on all the bearings.

In order to avoid needless loss of fat in the skim-milk and variation in the test of the cream, the following points must be observed: (1) The speed of the separator must be maintained according to the directions sent with it. The only reliable way to do this is to count the number of revolutions of the crank by the watch. Some machines are now equipped with an automatic device which rings a bell when the separator is run at too low a speed. A low

speed means loss of fat in the skim-milk and a lower testing cream. (2) The temperature of the milk should not be under 90 degrees F., and, therefore, the best time to separate milk is immediately after milking. A low temperature results in loss of fat in the skim-milk and a higher testing cream. (3) The flow of milk into the separator bowl should be uniform. The faster the milk passes through the separator, the thinner will be the cream. If the flow of milk is retarded, a higher testing cream will be obtained. The amount of milk in the supply can, therefore, should be kept as uniform as possible since the float does not fully control the feed. (4) Just enough skim-milk or water should be used to discharge the cream remaining in the separator bowl after the supply can is empty. An excess of either will considerably lower the test of the cream.

For more detailed information regarding the causes of variation in the percentage of fat in hand separator cream, the reader is referred to Circular No. 18, D. & C.S., which may be obtained gratis from the Publications Branch, Department of Agriculture, Ottawa.

Every separator has some device for changing the test of the cream. In most cases, the adjustment is at the cream outlet, in which case by turning the cream screw in, the cream will be richer and, by turning it out, the cream will be thinner. The opposite procedure is necessary with those separators which are equipped with a skim-milk screw.

All the parts of the separator which come in contact with the milk or cream should be washed in warm water, to which has been added a small quantity of sal soda or other cleansing powder and then thoroughly scalded with boiling water, *each* time the separator is used. The mere running of warm water through the machine after separation is not sufficient cleansing to insure high quality cream.

Location of Separators.—The ideal location for a cream separator is in a properly constructed milk room or farm dairy such as described in Bulletin No. 16, "Small Cold Storages and Dairy Buildings," copies of which may be obtained free from the Publications Branch, Department of Agriculture, Ottawa.

Occasionally the separators are placed in the cow stables. This may be a convenient arrangement, but it is by no means a proper place for separating milk, unless a special room, well ventilated and lighted is partitioned off, to exclude the stable odours and dust. This room should have a smooth cement floor, which can easily be cleaned.

Gasolene Flavoured Cream.—When the cream separator is operated with a gasolene engine, the strictest precautions must be taken to avoid a gasolene flavour (carbon monoxide) in the cream and butter. Butter having this defect is very objectionable and is placed in third grade. The following suggestions will assist in preventing the absorption of gasolene flavour by cream:—

(1) All possibility of the entrance of fumes from the engine exhaust into the separator room must be avoided. This can be effected by having a tight connection between the engine and exhaust pipe and by directing the pipe through the roof instead of through the wall of the building. By this arrangement, no matter what direction the wind may be, the fumes are blown away from the cream.

(2) A tight wooden partition between the separator and the engine helps to keep gasolene odours from the cream.

(3) When possible, arrange the equipment so that the separator is between the direction from which the most prevalent winds blow and the engine.

(4) The operator should practise the utmost care when handling gasolene and the engine to avoid carrying gasolene odours on his hands and clothing.

(5) Never place gasolene in a cream can, milk pail or any dairy utensil.

THE CREAM AND ITS CARE

Advantages of a Rich Cream.—Skimming a rich cream leaves more skim-milk for feeding young stock; there is less can room required for the cream and

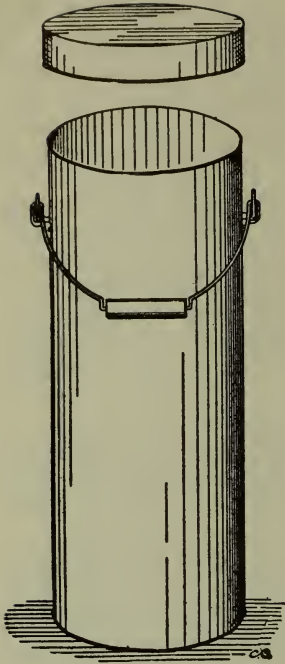


FIG. 1

For cooling the cream, the insulated tank as shown in fig. 2 is recommended.

less cream to cool; it will keep sweet longer than thin cream, other conditions being equal; it will churn more easily, and will make better flavoured butter than can be made from thin cream. The cream should be skimmed of such richness that one gallon (10 pounds) of it will yield 3 to 3½ pounds of butter.

Cooling the Cream.—The cream should be cooled immediately after skimming to under 60 degrees F., and kept cool until about twelve hours before churning.

If cream is allowed to stand at a high temperature (70 to 75 degrees F.) for any length of time, the flavour will be injured, and it is apt to become curdled or lumpy. This condition will cause serious loss of fat in the buttermilk and the quality of the butter will not be fine. The easiest and best way to keep cream sweet and clean in flavour is to put it in a shotgun can (fig. 1)—a well soldered plain bottomed tin can about 8 inches in diameter and 20 inches deep—and place it in a tank of iced water immediately after skimming. Tin cans are preferable to crocks, because they are easier to handle and, if the temperature of the cream has to be changed for churning, it can be done very much more quickly and easily when in tin cans by surrounding them with either warm or cold water.

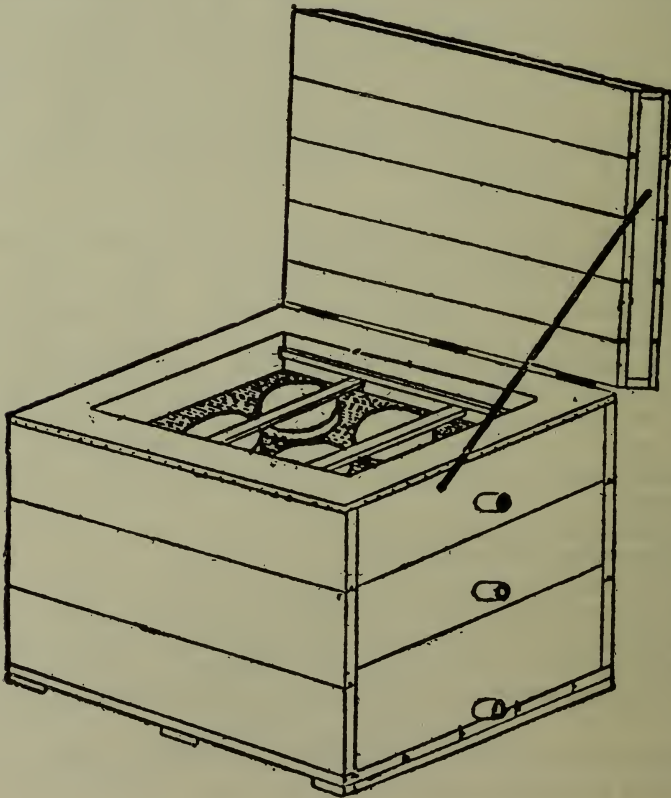


FIG. 2

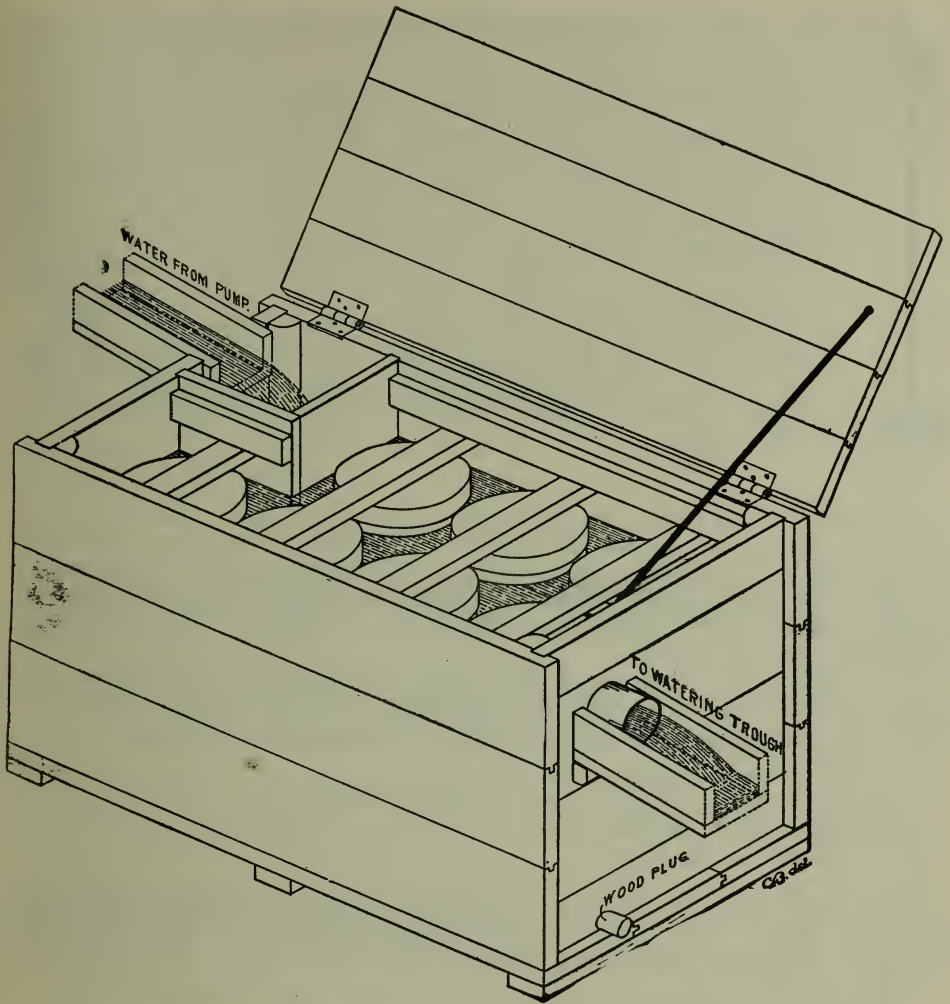


FIG. 3

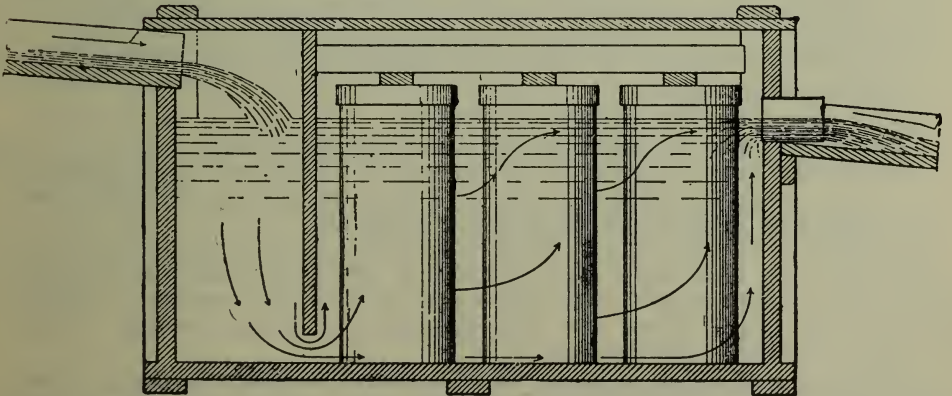


FIG. 4



FIG. 5

This tank is made with a space of four inches on all sides and on the bottom which is filled with planing mill shavings, the cover being insulated in the same manner. It is lined inside with galvanized iron. Such a tank is a great saver of ice, but is a little more expensive to make than that described in figs. 3 and 4, page 5. All tanks should have covers, as they help to keep down the temperature of the water and cream. Water or ice should not be put into the cream to raise or lower the temperature. After separating, cool the warm cream to 50 degrees F., or lower before adding to the main supply. Never mix warm with cooled cream. The cream should be stirred well each time a fresh lot is added and occasionally until it is nearly ready to churn. Fig 5 shows a first-class cream stirrer with a saucer-shaped perforated tin disk and a wire handle about 24 inches long. The use of a wooden stirrer is not advisable owing to the difficulty of keeping it clean and sterile.

Preparing the Cream for Churning.—This means developing the proper acidity (sourness) and having the cream at the right temperature. No fresh cream should be added for at least twelve hours before churning. If the cream is sweet at this time, a small quantity (5 to 10 per cent) of clean flavoured sour skim-milk may be added with good results and the cream kept at churning temperature for twelve hours.

The appearance of the cream when ready to churn should be smooth and glossy, and pour like thick syrup; it should smell and taste slightly sour.

The proper temperature of the cream for churning depends upon:

- (1) The richness of the cream.
- (2) The length of time the cows have been milking.
- (3) The breed of the cows and,
- (4) The feed of the cows.

It will, therefore, be seen how difficult it is to give any temperature as the best for churning. It is well, however, to know that the following conditions require low churning temperatures (54 to 62 degrees F.) :—

- (1) Very rich cream.
- (2) Cream from the milk of fresh cows.
- (3) Cream from the milk of Holstein and Ayrshire breeds.
- (4) Cream from the milk of cows receiving linseed meal, gluten feeds, soya bean meal and succulent feed, such as fresh pasture and clover.

Conditions that require high churning temperatures (64 to 75 degrees F.) :—

- (1) Very thin cream.
- (2) Cream from cows a long time in milk.
- (3) Cream from the milk of Jersey and Guernsey breeds.
- (4) Cream from the milk of cows receiving cotton-seed meal, potatoes, corn meal, corn silage, sweet corn fodder, wheat bran, sugar beets and dry feed, such as hay, straw and dry pasture.

It cannot be definitely stated how high it may be necessary to raise the temperature of the cream to churn under some of the above conditions, and the best rule that can be given is to raise the temperature high enough to bring the butter in about thirty minutes.

Too high a churning temperature will cause the butter to come in soft lumps instead of in a flaky granular condition. The texture will be greasy and

too much buttermilk will be incorporated in the butter which is likely to sour and spoil the flavour.

Too low a churning temperature is also undesirable, although it is better to have the temperature a little low rather than too high. Cream at too low a temperature is difficult to churn. When the butter does come, it will be in such a firm condition that it will not gather properly, and is apt to make a dry, brittle butter that does not spread easily. It is nearly always necessary to have a higher churning temperature in the fall and winter than in the spring and summer. Aim to have the cream at such a temperature that the churning will be completed in from twenty-five to thirty minutes.

Occasionally cream will not churn readily even at the highest churning temperature mentioned above. This condition usually occurs in the winter months when the cows have been milking a long time and they are being fed on dry feed. These conditions tend to make the butter fat globules very hard and it is difficult to get them massed together as butter. When ordinary churning temperatures will not overcome the difficulty, it is advisable to pasteurize the cream to 140 or 145 degrees.

PASTEURIZATION OF CREAM

Pasteurizing cream means heating it to a temperature of 140 to 180 degrees and cooling it down quickly to a ripening or churning temperature. This is easily done in creameries where special machinery is provided and an abundant supply of steam and cold water is available. It is not so easily done on the farm, but in cases where there is difficulty in getting the cream to churn, when there are bad flavours on the cream, when the butter is going to be stored for winter use, or a mild flavoured butter is desired, it will pay to pasteurize. In dairies where steam is available, the heating of the cream can be done by providing shot gun cans (fig. 1) in which to put the cream, then place these cans in a tub or box of water and turn the steam into the water. When the desired temperature is reached, the water can be drawn off and cold water or water and ice can be put in the box to cool the cream. Where no steam is available, an ordinary wash boiler half filled with water may be set on the stove and the shot gun cans set in it. The cooling may be done in a tub or box, as stated above. The cream must be stirred continually while being heated. Cooling will be done more quickly and effectively if the cream is stirred.

Pasteurizing Temperature.—When getting the cream to churn is the only difficulty, a temperature of 145 degrees will be high enough. If there is a bad flavour on the cream, or if the butter is going to be kept for several months, the best results will be secured by heating to a temperature of 165 to 180 degrees. Heating to these high temperatures will impart a cooked flavour to the butter, which will, however, pass off in about 10 days, leaving a mild sweet flavour.

Pasteurizing should not be done until all the cream for a churning is on hand. The cream should remain at churning temperature for at least three hours before churning.

Pasteurized cream usually requires a slightly lower churning temperature than unpasteurized cream. If the butter comes soft, the churning temperature of the cream should be lowered or the time between cooling and churning lengthened.

CHURNING

All the cream should be passed through a finely perforated tin strainer as it is being put into the churn. (See fig. 6.)

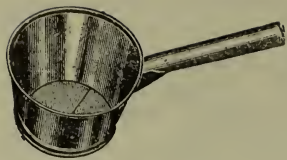


FIG. 6

Amount of Cream in the Churn.—Churning will be completed in the shortest time when the churn is about one-third full. The churn should never be more than half full.

Colouring.—When colouring is used, it should be added to the cream just before churning is commenced. Colouring does not improve the quality of the butter, but in the late fall and winter months a little colouring improves its appearance. The buttermakers must be guided in using colour by the tastes of their customers. Too deep a shade is undesirable.

Speed of the Churn.—The proper speed for the churn depends upon its size. That speed which gives the greatest concussion will be the most effective.

Adding Water to the Cream in the Churn.—If the cream has been properly prepared and is at the right temperature, the churning may be finished without adding any water. If for any reason the butter is coming a little too fast, it is advisable to add, just when the cream is breaking, some water with a little salt in it about two degrees colder than the cream. This will assist in separating the butter from the buttermilk. Two common causes for cream churning too slow are (1) too much cream in the churn and (2) the temperature of the cream too low.

When to Stop the Churn.—This is an important point and it has a great deal to do with the quality of the butter. The churn should be stopped when the granules are about the size of wheat or split peas. When the granules are too small many of them will go through the strainer into the buttermilk and cause a considerable loss.

Over-churning should be avoided as much as under-churning. Over-churned butter will retain a large amount of buttermilk, which will be difficult to remove in washing.

The buttermilk should be drawn off as soon as churning is completed.

The Cream Strainer.—A dipper with a wire gauze bottom (fig. 6) can be used for straining the buttermilk.

Washing the Butter.—The butter should be washed as soon as churning is finished and only pure clean water should be used. If the butter is for immediate use, rinse the butter by sprinkling two or three dipperfuls of cold water over the butter, allowing it to run off at once. Then run in a little less water than there was cream and revolve the churn as in churning until the granules are about the size of large peas and draw the water off immediately. In very warm weather have the water about 2 degrees colder than the buttermilk and in cold weather from 2 to 3 degrees warmer.

If the butter is intended for packing, run in slightly more water than there was cream, about 2 degrees colder than the buttermilk, and revolve the churn quickly about half a dozen times and draw it off; then wash a second time using a little less water than there was cream, at the same temperature as the buttermilk, and revolving the churn as in churning until the granules are about the size of large peas and draw off the water at once.

Salting the Butter.—A large quantity of dairy butter is too heavily salted and there is very little uniformity in the amount of salt used. We would suggest that for prints one-half to three-quarters of an ounce per pound be used, and for packed butter not more than one ounce per pound.

In creamery buttermaking the salting is done almost entirely in the churn. If the amount of butter in the churn can be fairly well estimated, it is the best method to follow. Add the salt as soon as the washing water is drained off, sifting on half of the salt evenly over the butter; then turn the butter over with a wooden ladle (fig. 7) or by turning the churn partly over, and sift on the balance of the salt; put on the cover of the churn and revolve slowly until the butter is gathered into a solid mass, and allow it to lie in the churn for ten to twenty minutes before working it. If the salting is done on the worker, the butter can be weighed and the salting done accurately. Take the butter out of the churn in the granular form, after weighing it, spread it evenly over the worker and sift all the salt on before working is commenced. Endeavour to have the salt well mixed with the butter while it is still in the granular form.



FIG. 7

Working the butter.—For farm buttermaking, a lever butter worker is preferable to a butter bowl for working the butter. (See fig. 8.) In working

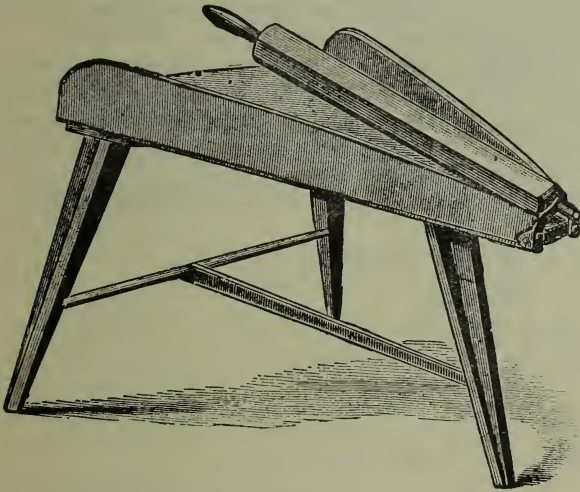


FIG. 8

the butter a sliding or scraping motion should be avoided. The lever should be pressed downward, double the butter over with a ladle, or by inserting the lever under the butter at one side of the worker, roll it over and work as before. When the butter is sufficiently worked, it should present a smooth solid appearance when cut with a sharp ladle, and when pressed between the worker and the ladle the moisture should show in small beads evenly distributed over the cut surface. Butter which has been salted in the churn will not require as much working as that salted on the worker. Only fine dairy salt should be used and it should be kept

in a clean place, as salt will absorb odours and thus may injure the flavour of the butter.

PACKAGES

Unfortunately, a very large quantity of dairy butter is placed on the market in packages which are neither attractive nor convenient to handle.

Packed Butter.—For packed butter, there is nothing so neat as a 10 or 20-pound spruce tub lined with parchment paper.

Print Butter.—The brick-shaped 1-pound print and the flat oblong 2-pound print neatly wrapped in parchment paper are the most popular and attractive packages.

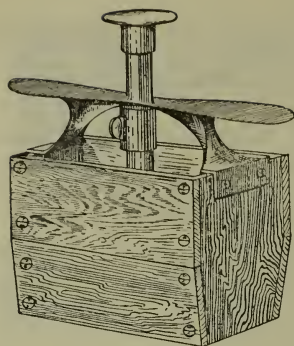


FIG. 9

Parchment Paper.—Print butter should always be wrapped in parchment paper of good quality, and it will add to the attractiveness of the package if the name of the farm or dairy, and the address of the proprietor, are neatly printed on each wrapper. Many dairy buttermakers seem to forget that the merchant who buys their butter must resell it, and that the appearance of the butter has much to do with a customer's decision in buying. No one cares to buy a slovenly package of butter, for it is a fairly safe inference that if the outside of the butter looks clean and attractive, the inside will be all right, and vice versa.

LEGAL BRANDING OF PRINT BUTTER

In reference to printed wrappers, the regulations passed under authority of the Dairy Industry Act provide that no person shall cut or pack dairy butter in blocks, squares or prints and wrap such blocks, squares or prints in parchment paper unless the said parchment paper is printed or branded with the words "dairy butter" in letters at least one-quarter of an inch square.

The same regulations provide further that every person who packs dairy butter in boxes similar to those used for the packing of creamery butter shall cause such packages to be branded at the time of packing with the words "dairy butter" in letters at least one-half inch long and three-eighths of an inch wide. Such branding must be applied on the side of the box.

We would suggest the following form as suitable for the printing of dairy butter wrappers:—

CHOICE DAIRY BUTTER

Made by

Mrs. John Doe,

Rose Bank Farm, Doeville,
Ontario.

UTENSILS AND THEIR CARE



FIG. 10

The Churn.—The barrel churn (fig. 10) is the most convenient and easiest to keep sweet and clean. Before using, it should be well scalded with boiling water and then cooled by revolving a few minutes with cold water in it. After using, remove particles of butter with hot water. Wash with hot water that contains a little washing soda; then scald with boiling water and leave it in a clean dry place. A little salt sprinkled in the churn after scalding helps to keep it sweet, as does also an occasional washing with hot lime water.

The Butterworker.—The V-shaped lever butterworker (fig. 8) is the most convenient for farm dairy work. In preparing the worker for use, it should be well scrubbed with a brush and boiling water and then thoroughly cooled by pouring on cold water. The butter printer (fig. 9) and ladle

should be washed in the same way and then put into cold water for some time before using. Sometimes the butter will stick to the worker and printer. This indicates that they have not been properly brushed with hot water before cooling. A thorough brushing with hot water with a little salt added, before cooling, will remedy this trouble.

Thermometers.—It will be noticed that all through the process of making butter, proper temperatures are essential to get the best results. It is, therefore, absolutely necessary that the successful buttermaker should have a correct dairy thermometer. One that is correct cannot always be purchased at the ordinary stores, but can be procured from any of the leading dairy supply houses throughout the Dominion. A float or glass thermometer is preferable to the metal backed style, as it is much easier to keep clean.

To get the best results in farm dairy work:—

- (1) Keep good cows.
- (2) Feed them liberally.
- (3) Keep them comfortable and clean when in the stable.
- (4) Skim a cream testing about 30 per cent.
- (5) Keep the cream cool.
- (6) Have the churning temperature such that the churning will be completed in from twenty-five to thirty minutes.
- (7) Use clean, pure water for washing butter, not more than three degrees colder or warmer than the buttermilk.
- (8) Put the butter up in neat, clean, attractive packages.
- (9) Keep everything in and about the dairy clean and attractive.

Note.—Copies of this bulletin in English or French may be secured free of charge on application to the Publications Branch, Department of Agriculture, Ottawa.

PUBLICATIONS ON DAIRYLING

The following publications of the Department of Agriculture relating to Dairying are available on application to the Publications Branch, Department of Agriculture, Ottawa.

OLD SERIES

Condensed Cheese	D and U.S. Bull.	25
The Cheese Loom in Buttermaking	D and C.S. Bull.	31
The Field Storage of Food Products, with Some Notes on Insulation and Moisture Management	D and U.S. Bull.	34
Food Residual for Cow Feeding	D and U.S. Cir.	35
Notes on Cow Feeding	D and U.S. Cir.	40
The Principles of Dairy Baking	D and C.S. Cir.	42
Causes of Variation in the Percentage of Fat in Milk Separator Cream	D and C.S. Cir.	44
Cow Feeding	D and U.S. Cir.	50
The Manufacture of Cottage and Buttermilk Cheese	D and C.S. Cir.	52
The Manufacture of Buttermilk from Skimmed Milk	D and C.S. Cir.	56
Yield and Relative Value of Some Dairy Products	D and U.S. Cir.	57
Cheese Milk	Emp. Farm Cir.	59
Some Notes on Lamp Cow	Emp. Farm Cir.	61
Stencilling Cases	Emp. Farm Cir.	62
Cheese Making and Cheese	Emp. Farm Cir.	63
Cheese Making	Emp. Farm Cir.	64
Buttermilk	Emp. Farm Cir.	65

NEW SERIES

The Treatment of Milk Cream and Dairy By-Products	Bull.	11
Milk Crystallization	Bull.	13
Cheese Factors and Veterinary Plans with Illustrations	Bull.	17
The Cause and Prevention of Mould in Canadian Pasteurized Butter	Bull.	48
Weight Measure on the Storage of Ice	Planp.	3
The Control of Dairies and Milksters	Planp.	5
On Cow Feeding With Butter	Planp.	23
Milk and Cream	Planp.	27
The Control of Milk for Cheese-making	Planp.	28
The Field Dairy Storage, a Further Review of Progress	Planp.	44
Improvement Factors Deserts	Planp.	49
The Commercialization of Cheese for Butter-making	Planp.	53
The Dairy Industry Act and Regulations	Acta, Orders and Regulations No. 13	
The Dairy Industry Act and Regulations	Acta, Orders and Regulations No. 17	
Vegetal and Mineral Sources of Phosphorus and Calcium in Dairy Feeds	Cir.	22

